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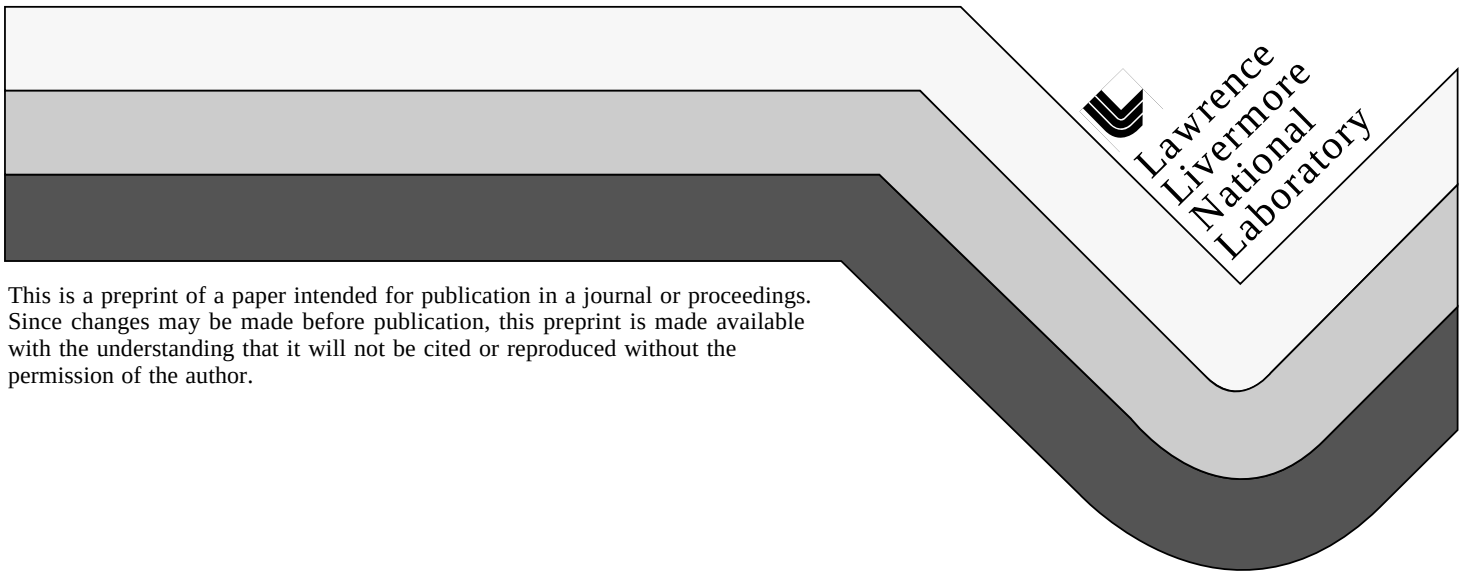

SUMMARY OF PERSONAL MONITORING DATA FOR ASBESTOS-RELATED MAINTENANCE WORK AT THE LAWRENCE LIVERMORE NATIONAL LABORATORY

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INTRODUCTION

The Lawrence Livermore National Laboratory (LLNL) consists of 665 structures with approximately 6 million square feet of space. Many of the buildings date from the 1940's to 1980's and contain asbestos-containing materials (ACM). Maintenance and Operation activities, as well as full scale asbestos abatement and repair, has been conducted for many years. One result all this activity is that a substantial database of personal monitoring data that has been collected. This database is a collection of reported {Fed OSHA} Permissible Exposure Limit (PEL) information, including 8-hour Time Weighted Averages (TWA) and 30-minute Excursion Limit (EL) samples.

Because this data represented a wide variety of asbestos removal techniques, materials and sampling strategies and industrial hygienists, a rigorous statistical comparison is of limited value. By summarizing the data by procedure category, procedures likely to result in significant exposures can be identified.

METHODS

This data was gathered over three years from a wide variety of asbestos removal procedures at the LLNL site. These data values were taken directly from an existing database of sampling reports from eight different LLNL Industrial Hygienists. All values were reported as 8-hour TWAs and/or 30 minute ELs. In a few instances, excursion values were not listed in the reports and were calculated from the existing data in the reports.

All samples used to generated this data were analyzed by phase contrast microscopy in accordance with National Institute Occupational Safety and Health (NIOSH) method 7400. Forensic Analytical Laboratory of Hayward Ca. and the LLNL Analytical Laboratory performed all samples analysis. Both laboratories are accredited by the AIHA.

DATA ANALYSIS

Data was originally separated into two categories, Reported 8-hour Time Weighted Averages (TWA) and 30-minute Excursion Limit (EL) results. Individual data points were screened to see if the approached or exceeded the OSHA Permissible Exposure limit of 0.1 fiber/cc as an 8-hour Time Weighted Average (TWA) and the OSHA 30-minute excursion (EL) Permissible Exposure Limit of 1.0 fibers/cc. Individual data points that approached or exceeded the regulatory limits were screened to see what work procedures generated these significant exposures.

In order to look at the differences between exposure levels for different work categories, data points were also grouped according to procedure description. Procedure descriptions included in this presentation include decontamination and encapsulation of contaminated areas, thermal system insulation (TSI) removal using glove bags, Misc. gasket/insulation removal, wallboard/skimcoat removal, vinyl asbestos tile (VAT) abatement using wet methods, the removal of VAT mastic using

solvents, , transite (cement asbestos) work, and roofing material removal. Data ranges and mean values were calculated for all procedure description categories. These results are presented in both chart and graph form. These charts are a historical record of exposure during

RESULTS

8-HOUR TWA RESULTS

- One hundred and eighty-six (186) exposure results were reported from 1992 to 1995.
- 109 of the reported results were 8-hour time weighted averages (TWAs).
- 3 results (3%) equaled or exceeded the current 8-hour TWA PEL of 0.1 f/cc
- The highest reported 8-hour TWA was 0.13 f/cc .
- All results above the 8-Hour TWA were during decontamination..
- No other operation description categories had results above the PEL.
- Eleven of the 109 reported TWA sample results exceeded 0.05 f/cc (1/2 of PEL).
- These eleven elevated results were in the Decontamination and TSI removal categories.

8-Hour Time Weighted Average Results

Work Category	# Samples	# Approach 8-Hr TWA	# Greater 8-Hr TWA	Mean	Range
decontamination	28	8	1	0.033	0.002-0.110
TSI/glove bag	22	3	0	0.023	0.003-0.090
misc. gasket/insul	4	1	0	0.028	0.010-0.060
wallboard	6	0	0	0.015	0.006-0.028
VAT removal	15	0	0	0.006	0.003-0.010
mastic removal	4	0	0	0.005	0.005-0.006
transite work	12	0	0	0.007	0.002-0.010
roofing work	7	0	0	0.007	0.003-0.010

30-Minute Excursion Limit (EL) Samples

- 77 of the 186 reported results were 30-minute EL values.
- None of the results exceeded the 30 minute excursion limit of 1.0 f/cc.
- Eight excursion sample results (9%). approached the 30-minute Excursion Limit (>0.33 f/cc or 33 % of the applicable EL) .
- Seven of the eight samples that approached the 30 Minute Excursion Limit were in the TSI removal with Glove Bag procedure description category.
- One of the samples that approached the 30 minute EL was in the Decontamination operation category.

Summary of 30 minute Excursion Limit Sample Results

Work Category	# Samples	Approaching EL	# Greater than EL	Mean (f/cc)	Range (f/cc)
decontamination	3	1	0	0.14	0.04-0.36
TSI/glove bag	25	7	0	0.30	0.05-0.91
misc. gasket/insul	6	1	0	0.21	0.09-0.53
wallboard	7	0	0	0.05	0.04-0.09
VAT removal	13	0	0	0.04	0.04-0.06
mastic removal	6	0	0	0.05	0.04-0.06
transite work	6	0	0	0.05	0.02-0.06
roofing work	4	0	0	0.03	0.00-0.04

GLOVE BAG REMOVAL OF TSI

- 9 different jobs involving Glove Bag removal of TSI
- Glove Bag removal of TSI resulted in significant exposure.
- 7 of the 25 (%) reported 30 minute EL samples approached the 1.0f/cc 30 minute EL. There were no reported exposures in excess of the 30 minute EL.
- 3 of 22 8-hour TWA results approached 0.1 f/cc 8-hour TWA- PEL. There were no reported exposures in excess of the 8-hour TWA- PEL.
- The short duration of most glove bag removal jobs probably limited the 8-hour time weighted average exposures to below the PEL.

SURFACE DECONTAMINATION

- 3 different jobs involving Surface Decontamination.
- During surface decontamination work, 5 of the 32 8-TWA values approached the 1.0 f/cc PEL (23 %) and 3 values exceed the 8-hour TWA.
- One excursion sample value approached the PEL (14 %)
- Significant exposure during decontamination operations is not surprising due to the high percentage of asbestos in the material being cleaned up.

VINYL ASBESTOS TILE (VAT) REMOVAL;

- 7 different jobs involving VAT Removal
- None of the 28 reported 8-hour TWA or 30-minute EL results approached the 30-minute EL or 8-hour TWA-PEL.
- VAT removal did not result in significant exposures

ASBESTOS CEMENT WORK (TRANSITE) REMOVAL;

- 4 different jobs involving the removal or handling of Transite.
- None of the 18 reported 8-hour TWA or 30 minute EL results approached the 30-minute EL or 8-hour TWA-PEL.
- Transite removal did not result in significant exposures

CONCLUSIONS

- Work procedures which rarely resulted in significant exposures included wallboard/skimcoat removal, vinyl asbestos tile (VAT) abatement using wet methods, the removal of VAT mastic using solvents, , Transite (cement asbestos) work, and roofing material removal

- Work procedures which frequently resulted in the exposures that approached or exceeded regulatory limits included Glove Bag removal of TSI, Surface Decontamination, and gasket and wire insulation removal.

- Glove bag removal of TSI resulted in significant exposures. 7 of 25 (28%) reported EL samples approached the regulatory limit of 1.0 f/cc. 3 of 22 (14%) reported 8-hour TWA's approached the PEL of 0.1 f/cc. The short duration of most glove bag jobs limited 8-hour TWA exposures.

- Surface decontamination resulted in significant exposures. 1 of 3 (33%) reported 30 minute EL samples approached the applicable regulatory limit of 11.0 f/cc. 1 of the 28 (4%) reported TWA results exceeded the applicable regulatory limit of 0.1f/cc. 8 (28%) of the reported TWA results approached 0.1 f/cc

- Work procedures where exposures frequently approached or exceeded regulatory limits typically involved working with materials that contain high percentage asbestos in a loose matrix.

- Work procedures where exposures were well below regulatory limits frequently involved working with asbestos containing materials in a tightly bound matrix.

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